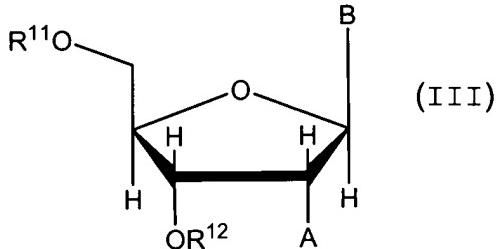


CLAIMS

**I CLAIM:**

1. A compound having the formula (III)

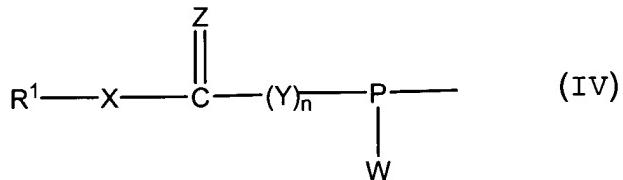


wherein:

A is hydrogen, hydroxyl, halogen, lower alkoxy, lower alkoxy-substituted lower alkoxy, SH, NH<sub>2</sub>, azide or DL wherein D is O, S or N and L is a heteroatom-protecting group, unsubstituted hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl, or substituted heteroatom-containing hydrocarbyl;

B is a nucleobase selected from the group consisting of unprotected and protected purines, pyrimidines, and analogs thereof; and

one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (IV)



in which

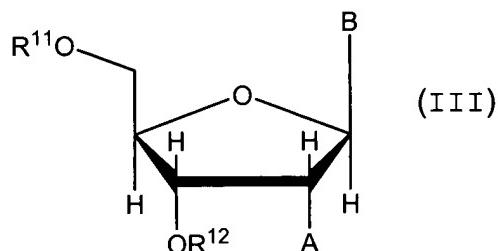
R<sup>1</sup> is hydrogen, a protecting group removable by an elimination reaction, hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl or substituted heteroatom-containing hydrocarbyl;

n is zero or 1;

W is NR<sup>2</sup>R<sup>3</sup> or DL wherein R<sup>2</sup> and R<sup>3</sup> are independently selected from the group consisting of hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl and substituted heteroatom-containing hydrocarbyl, or R<sup>2</sup> and R<sup>3</sup> are linked to form a substituted or unsubstituted, five- or six-membered nitrogen-containing heterocycle, D is O, S or NH, and L is a heteroatom-protecting group, unsubstituted hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl, or substituted heteroatom-containing hydrocarbyl;

$X$  is O, S NH or NR<sup>7</sup> wherein R<sup>7</sup> is hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl or substituted heteroatom-containing hydrocarbyl;  
 $Y$  is -(Y')<sub>m</sub>-(CR<sup>8</sup>R<sup>9</sup>)- wherein m is zero or 1, Y' is hydrocarbylene, substituted hydrocarbylene, heteroatom-containing hydrocarbylene, or substituted heteroatom-containing hydrocarbylene, wherein R<sup>8</sup> and R<sup>9</sup> are independently selected from the group consisting of hydrogen, hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl and substituted heteroatom-containing hydrocarbyl; and  
 $Z$  is O, S, NH or NR<sup>10</sup> wherein R<sup>10</sup> is as defined for R<sup>7</sup>.

2. A compound having the formula (III)

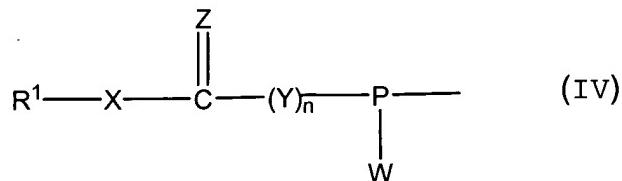


wherein:

$A$  is hydrogen, hydroxyl, or protected hydroxyl;

$B$  is a nucleobase selected from the group consisting of unprotected and protected purines, pyrimidines, and analogs thereof; and

one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (IV)



in which

$R^1$  is hydrogen, a protecting group removable by an elimination reaction, or an unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moiety selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl, cycloalkylalkyl, cycloalkylaryl, alkenyl, cycloalkenyl, alkynyl and aralkynyl;

$W$  is NR<sup>2</sup>R<sup>3</sup> or DL wherein R<sup>2</sup> and R<sup>3</sup> are unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moieties selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl, cycloalkylalkyl, cycloalkylaryl,

alkenyl, cycloalkenyl, alkynyl and aralkynyl, or R<sup>2</sup> and R<sup>3</sup> are linked to form a substituted or unsubstituted, five- or six-membered nitrogen-containing heterocycle, D is O, S or NH, and L is a heteroatom-protecting group removable by an elimination reaction;

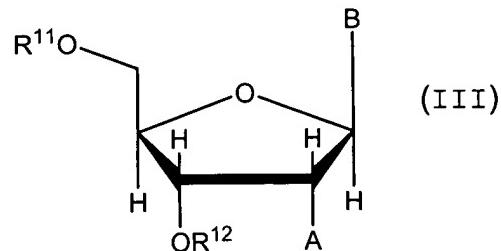
n is zero or 1;

X is O or S;

Y is -(Y')<sub>m</sub>-(CR<sup>8</sup>R<sup>9</sup>)- wherein m is zero or 1, Y' is an unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moiety selected from the group consisting of alkylene, arylene, aralkylene, alkarylene, cycloalkylene, cycloalkylalkylene, cycloalkylarylene, alkenylene, cycloalkenylene, alkynylene and aralkynylene, wherein R<sup>8</sup> and R<sup>9</sup> are independently selected from hydrogen and unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moieties selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl, cycloalkylalkyl, cycloalkylaryl, alkenyl, cycloalkenyl, alkynyl and aralkynyl; and Z is O or S.

3. The compound of claim 2, wherein n is zero.
4. The compound of claim 2, wherein n is 1.
5. The compound of claim 4, wherein m is zero.
6. The compound of claim 4, wherein m is 1.
7. The compound of claim 2, wherein Z is O.
8. The compound of claim 7, wherein X is O.
9. The compound of claim 2, wherein R<sup>1</sup> is a protecting group removable by an elimination reaction.

10. The compound of claim 9, wherein R<sup>1</sup> is selected from the group comprised of β-cyanoethyl, methyl-β-cyanoethyl, dimethyl-β-cyanoethyl, phenylsulfonyleethyl, methylsulfonyleethyl, p-nitrophenylsulfonyleethyl, 2,2,2-trichloro-1,1-dimethyleethyl, 2-(4-pyridyl)ethyl, 2-(2-pyridyl)ethyl, allyl, 4-methylene-1-acetylphenol, -thiobenzoyleethyl, 1,1,1,3,3,3-hexafluoro-2-propyl, 2,2,2-trichloroethyl, p-nitrophenyleethyl, p-cyanophenyleethyl, 9-fluorenylmethyl, 1,3-dithianyl-2-methyl, 2-(trimethylsilyl)ethyl, 2-methylthioethyl, 2-(diphenylphosphino)ethyl, 1-methyl-1-phenyleethyl, 3-buten-1-yl, 4-(trimethylsilyl)-2-buten-1-yl, cinnamyl, -methylcinnamyl, and 8-quinolyl.
11. The compound of claim 2, wherein R<sup>1</sup> is hydrogen.
12. The compound of claim 2, wherein NR<sup>2</sup>R<sup>3</sup> is selected from the group consisting of dimethylamino, diethylamino, diisopropylamino, dibutylamino, methylpropylamino, methylhexylamino, methylcyclohexylamino, ethylcyclopropylamino, ethylchloroethylamino, methylbenzylamino, methylphenylamino, thiomorpholino, methyltoluylamino, methyl-p-chlorophenylamino, methylcyclohexylamino, bromobutylcyclohexylamino, methyl-p-cyanophenylamino, ethyl-β-cyanoethylamino, piperidino, 2,6,-dimethylpiperidino, pyrrolidino, piperazino, isopropylcyclohexylamino, and morpholino.
13. The compound of claim 12, wherein R<sup>2</sup> and R<sup>3</sup> are isopropyl.
14. A compound having the formula (III)

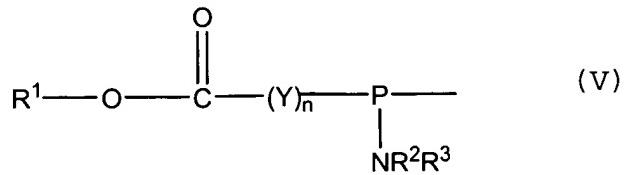


wherein:

A is hydrogen, hydroxyl, or protected hydroxyl;

B is a nucleobase selected from the group consisting of unprotected and protected

purines, pyrimidines, and analogs thereof; and  
one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (IV)



wherein:

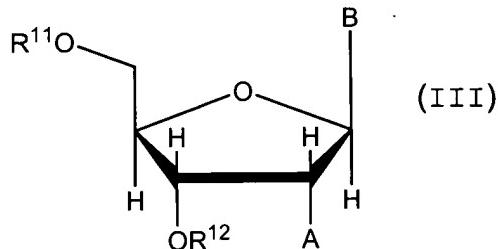
R<sup>1</sup> is hydrogen, lower alkyl, or a hydroxyl-protecting group removable by an elimination reaction;

R<sup>2</sup> and R<sup>3</sup> are lower alkyl, or R<sup>2</sup> and R<sup>3</sup> are linked to form a piperidino, piperazino or morpholino ring;

n is zero or 1; and

Y is -(Y')<sub>m</sub>-(CH<sub>2</sub>)- wherein m is zero or 1 and Y' is lower alkylene.

15. A compound having the formula (III)

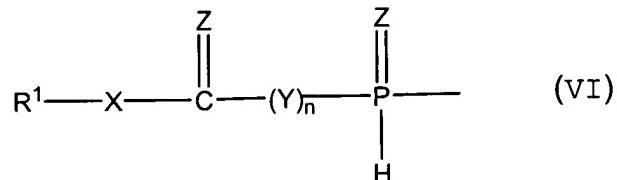


wherein:

A is hydrogen, hydroxyl, halogen, lower alkoxy, lower alkoxy-substituted lower alkoxy, SH, NH<sub>2</sub>, azide or DL wherein D is O, S or N and L is a heteroatom-protecting group, unsubstituted hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl, or substituted heteroatom-containing hydrocarbyl;

B is a nucleobase selected from the group consisting of unprotected and protected purines, pyrimidines, and analogs thereof; and

one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (VI)



in which

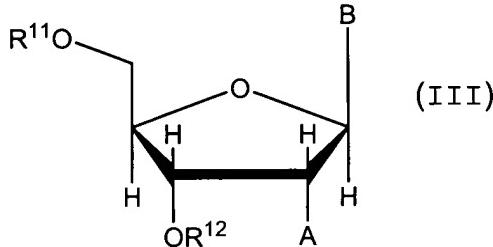
$R^1$  is hydrogen, a protecting group removable by an elimination reaction, hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl or substituted heteroatom-containing hydrocarbyl;

$n$  is zero or 1;

$X$  is O, S NH or NR<sup>7</sup> wherein R<sup>7</sup> is hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl or substituted heteroatom-containing hydrocarbyl;

$Y$  is -(Y')<sub>m</sub>-(CR<sup>8</sup>R<sup>9</sup>)- wherein m is zero or 1, Y' is hydrocarbylene, substituted hydrocarbylene, heteroatom-containing hydrocarbylene, or substituted heteroatom-containing hydrocarbylene, wherein R<sup>8</sup> and R<sup>9</sup> are independently selected from the group consisting of hydrogen, hydrocarbyl, substituted hydrocarbyl, heteroatom-containing hydrocarbyl and substituted heteroatom-containing hydrocarbyl; and each Z is independently O, S, NH or NR<sup>10</sup> wherein R<sup>10</sup> is as defined for R<sup>7</sup>.

16. A compound having the formula (III)

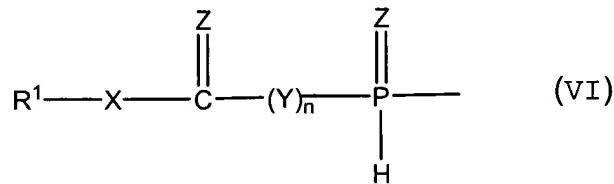


wherein:

A is hydrogen, hydroxyl, or protected hydroxyl;

B is a nucleobase selected from the group consisting of unprotected and protected purines, pyrimidines, and analogs thereof; and

one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (VI)



in which

$R^1$  is hydrogen, a protecting group removable by an elimination reaction, or an unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moiety selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl,

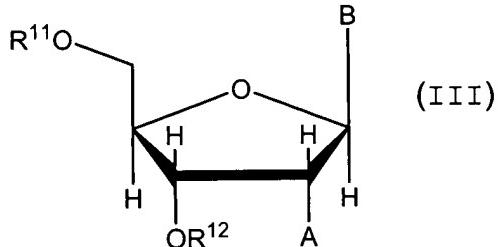
cycloalkylalkyl, cycloalkylaryl, alkenyl, cycloalkenyl, alkynyl and aralkynyl;  
n is zero or 1;  
X is O or S;  
Y is -(Y')<sub>m</sub>-(CR<sup>8</sup>R<sup>9</sup>)- wherein m is zero or 1, Y' is an unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moiety selected from the group consisting of alkylene, arylene, aralkylene, alkarylene, cycloalkylene, cycloalkylalkylene, cycloalkylarylene, alkenylene, cycloalkenylene, alkynylene and aralkynylene, wherein R<sup>8</sup> and R<sup>9</sup> are independently selected from hydrogen and unsubstituted, substituted, heteroatom-containing or substituted heteroatom-containing moieties selected from the group consisting of alkyl, aryl, aralkyl, alkaryl, cycloalkyl, cycloalkylalkyl, cycloalkylaryl, alkenyl, cycloalkenyl, alkynyl and aralkynyl; and each Z is independently O or S.

17. The compound of claim 16, wherein n is zero.
18. The compound of claim 16, wherein n is 1.
19. The compound of claim 16, wherein m is zero.
20. The compound of claim 16, wherein m is 1.
21. The compound of claim 20, wherein R<sup>1</sup> is a protecting group removable by an elimination reaction.
22. The compound of claim 21, wherein R<sup>1</sup> is selected from the group comprised of β-cyanoethyl, methyl-β-cyanoethyl, dimethyl-β-cyanoethyl, phenylsulfonylethyl, methylsulfonylethyl, p-nitrophenylsulfonylethyl, 2,2,2-trichloro-1,1-dimethylethyl, 2-(4-pyridyl)ethyl, 2-(2-pyridyl)ethyl, allyl, 4-methylene-1-acetylphenol, -thiobenzoylethyl, 1,1,1,3,3,3-hexafluoro-2-propyl, 2,2,2-trichloroethyl, p-nitrophenylethyl, p-cyanophenylethyl, 9-fluorenylmethyl, 1,3-dithionyl-2-methyl, 2-(trimethylsilyl)ethyl, 2-methylthioethyl, 2-(diphenylphosphino)ethyl, 1-methyl-1-phenylethyl, 3-buten-1-yl, 4-

(trimethylsilyl)-2-buten-1-yl, cinnamyl, -methylcinnamyl, and 8-quinolyl.

23. The compound of claim 20, wherein R<sup>1</sup> is hydrogen.

24. A compound having the formula (III)

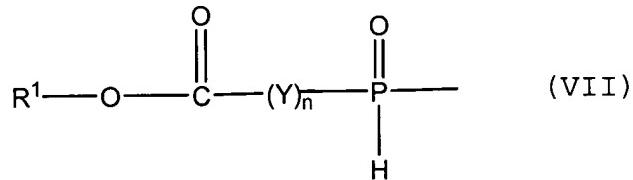


wherein:

A is hydrogen, hydroxyl, or protected hydroxyl;

B is a nucleobase selected from the group consisting of unprotected and protected purines, pyrimidines, and analogs thereof; and

one of R<sup>11</sup> and R<sup>12</sup> is a blocking group and the other has the formula (VII)



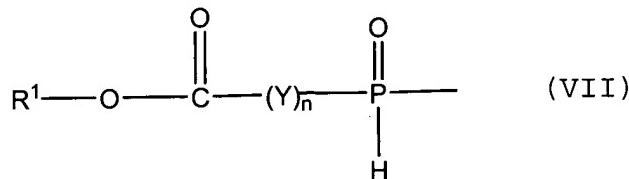
wherein:

R<sup>1</sup> is hydrogen, lower alkyl, or a hydroxyl-protecting group;

n is zero or 1; and

Y is -(Y')<sub>m</sub>-(CH<sub>2</sub>)- where m is zero or 1 and Y' is lower alkylene.

25. The compound of claim 24, wherein R<sup>11</sup> is a blocking group and R<sup>12</sup> has the formula (VII)



26. The compound of claim 25, wherein R<sup>12</sup> is a blocking group and R<sup>11</sup> has the formula (VII)

